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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/561,825

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Moshe Rakhman

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EXAMINER

LENIHAN, JEFFREY S

ART UNIT

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/561,825	Applicant(s) RAKHMAN ET AL.	
	Examiner Jeffrey Lenihan	Art Unit 1796	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/22/2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-31 and 33-41 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-31 and 34-41 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This action is responsive to the amendment filed on December 22, 2008.
2. The objections and rejections not addressed below are deemed withdrawn.
3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office Action.

Continued Examination Under 37 CFR 1.114

4. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/22/2008 has been entered.

Specification

5. The disclosure is objected to because of the following informalities: The examiner notes that there is a typographical error in Tables 1-5, 7, and 8 in the submitted specification wherein the cited Tables report the cross-link density of thermoplastic vulcanizates in units of " $\times 10^5$ mol/cm³;" however, the examiner notes that applicant routinely refers to the cross-link density as being measured on the order of $\times 10^{-5}$ mol/cm³ (see specification, Page 9 lines 21-22; original claim 25) The examiner also notes that, in the remarks filed on 12/22/2008, applicant refers to Table 8 as evidence

that other processes do not produce thermoplastic vulcanizates having a cross-linking density greater than 5×10^{-5} mol/cm³.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. Claims 1-31 and 33-39 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

7. Independent claim 1 recites the limitation that the duration of cross-linking is from “a minute to half and hour,” this limitation is present in all the dependent claims. The examiner takes the position that is unclear whether “half and hour” is intended to refer to 1.5 hours or is a typographical error intended to recite “half an hour.”

8. Claims 24 and 25 recite a thermoplastic vulcanizate (TPV) comprises a dispersed phase characterized by “high gel content.” The examiner notes that applicant states that TPVs wherein the gel content is greater than 95% are defined as fully cross-linked (Page 9, lines 14-17) and that a value of 70% or higher corresponds to a very high cross-linked phase content (Page 2, lines 5-7), but does not recite a threshold value which the gel content of the TPV disperse phase must meet to qualify as “high.” This limitation is also present in dependent claims 25-31 and 34-39. The examiner therefore takes the position that it is unclear how high the gel content of a TPV dispersed phase must be to meet the instant claims.

Claim Rejections - 35 USC § 102/ § 103

9. Claims 24-31 and 34-41 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Kirchner et al, EP1050548.

10. Kirchner discloses a thermoplastic composition comprising 30-80 parts by weight (pbw) of an ultra low-density polyethylene rubber (ULDPE rubber) vulcanizate in the form of particles dispersed in a matrix and 70-20 pbw of a thermoplastic polyolefin serving as a matrix-forming component, wherein the ULDPE rubber is grafted with an organosilane and dynamically vulcanized in the presence of a cross-linking agent (abstract) (claims 28, 30, 36, 38). Said ULDPE rubber component is preferably a copolymer of ethylene and an α -olefin having a density of 0.855 to 0.90 g/cm³ (§0015-0018) (claims 29, 37). Said ULDPE rubber is grafted with an organosilane such as vinyltrimethoxysilane (§0040) using an organic peroxide initiator such as dicumyl peroxide (§0041), as recited in the instant application. Said matrix polyolefin may be an isotactic polypropylene homopolymer or copolymer containing 1-20% by weight ethylene or other C₄-C₁₀ olefin monomer (§0022-0023) (claims 26, 27, 34, 35). The thermoplastic compositions are produced by subjecting a blend of the matrix polyolefin and the ULDPE rubber to dynamic vulcanization to the point that the gel content of the ULDPE rubber component is more than 95% by weight (§0043) (claims 24, 25, 40, 41) and a cross-linking density of more than 10×10⁻⁵ mol/cm³ (§0045) (claims 24, 25). The thermoplastic compositions disclosed by Kirchner may be processed via injection molding (§0078) (claims 31, 39).

11. Kirchner does not recite all of the properties recited by applicant-i.e. narrow gaps (ligaments) between cross-linked particles, etc. As discussed above, however, Kirchner discloses the production of a thermoplastic composition comprising a matrix polymer, which corresponds to the propylene (co)polymer recited by applicant, and a ULDPE rubber dispersed phase, which corresponds to the ethylene copolymer recited by applicant. The matrix and ULDPE rubber are combined in ratios similar to those recited by applicant. Kirchner further teaches cross-linking of the dispersed phase ULDPE via dynamic vulcanization of the same grafted vinyl silane compounds used by applicant for this purpose, and teaches the production of thermoplastic compositions having dispersed phase gel content and a cross-linking density corresponding to the values recited by applicant. As Kirchner discloses thermoplastic compositions prepared from combining the same materials in the same ratios as applicant and having similar properties of gel content and cross-linking density, the examiner takes the position that one of ordinary skill in the art would reasonably expect that the thermoplastic compositions of Kirchner would inherently have the same properties as the TPVs claimed by applicant.

12. MPEP § 2112 recites that "[T]he PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his [or her] claimed product. Whether the rejection is based on inherency under 35 U.S.C. 102, on *prima facie* obviousness under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same..." as that required with respect to product-by-process claims. *In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980). As discussed in MPEP

§ 2113, once the examiner provides a rationale tending to show that the claimed product appears to be the same or similar to that of the prior art, although produced by a different process, the burden shifts to applicant to come forward with evidence establishing an unobvious difference between the claimed product and the prior art product. *In re Marosi*, 710 F.2d 798, 802, 218 USPQ 289, 292 (Fed. Cir. 1983). The burden is therefore shifted to the applicant to prove that the properties used to define the TPVs of the instant application would not be present in the thermoplastic compositions disclosed by Kirchner.

Claim Rejections - 35 USC § 103

13. Claims 24-30, 34-38, 40, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943, referred to herein as Bernhard.

A discussion of the disclosure of Bernhard may be found in the Office Action dated 6/13/2008, incorporated herein by reference.

14. Regarding the newly added limitations that the thermoplastic vulcanizate is prepared via a process performed using a recited amount of cross-linking agent in the absence of water; the instant claims are product-by process claims directed towards the composition produced according to the process described in claim 1, as discussed in previous Office Actions. As the patentability of the product does not depend on its method of production, it is incumbent upon the applicant to demonstrate that the recited limitations are not obvious variants of the composition disclosed by Bernhard.

15. Claims 31 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bernhard Rustige GmbH & Co KG, DE4402943, in view of Coran et al, US4183876.

A discussion of the disclosures of the cited references may be found in the Office Action dated 6/13/2008, incorporated herein by reference.

16. The instant claims depend from claims 24 and 25, and are therefore product-by-process claims as discussed above.

Response to Arguments

17. Applicant's arguments filed December 22, 2008 have been fully considered but they are not persuasive.

18. Regarding the rejections of claims 24-31 and 34-41 over Bernhard; applicant has amended the independent claim 1 to recite the limitations that a) the weight ratio of the cross-linking agent to the organic silane is from 1:3 to 1:1, b) the duration of the cross-linking reaction is from a minute to half and hour, and c) the steps of grafting and cross-linking of the organic silane groups are performed in the absence of water. As noted in previous Office Actions, the instant claims are written in product-by-process format.

19. Applicant argues in the remarks filed on 12/22/2008 that the newly added limitations are essential to achieve the desired cross-linking density, and cites the data for the control Examples reported in Table 8 of the submitted specification as evidence

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that thermoplastic vulcanizates that are not produced according to the claimed process are not characterized by the claimed cross-linking density.

20. The examiner notes that the procedure used for the preparation of the control Examples is the same as that of Example 1 (according to the invention), with the exception that different compounds that do not act as cross-linking agents are added in the second mixture (as stated by applicant on page 23, lines 3-5). Example 1 does not specify the duration of the grafting and cross-linking reactions; the examiner therefore takes the position that the grafting and cross-linking reactions in the cited control Examples would fall somewhere within the ranges of 0.5-10 minutes and 1-30 minutes, respectively, as recited by applicant in the specification (Page 11, lines 7-8 and 24-25). Therefore, the examiner takes the position that while the data presented in Table 8 may allegedly demonstrate that the claimed combination of elements is necessary to attain the claimed cross-linking density within the short time period specified by applicant, the data does not demonstrate that the claimed combination of specific cross-linking agent and absence of water is required to produce a thermoplastic vulcanizate having the recited properties *per se*.

21. In remarks filed on 8/12/2008, applicant argued that combination of the recited amount of the specific cross-linking agent and the absence of water enabled a high degree of cross-linking to be performed within a short time. Applicant also states in the remarks filed on 12/22/2008 that the process of claim 1 represents a "fast and very efficient cross-linking step of the silane with the dispersed phase component." The filed

remarks therefore indicate that the combination of claimed elements is required to perform the cross-linking reaction in a short time period.

22. MPEP § 2113 [R-1] states “[E]ven though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. (emphasis added) If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.” In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). The examiner therefore takes the position that it is insufficient to demonstrate that the claimed combination of elements is required to prepare a thermoplastic vulcanizate wherein the disperse phase has a cross-linking density of 5×10^{-5} mol/cm³ in a short period of time. Rather, applicant is required to provide factual evidence that the recited properties are not inherently present in the thermoplastic vulcanizates rendered obvious by Bernhard.

23. As discussed in the previous Office Actions, Bernhard discloses thermoplastic vulcanizates comprising a polypropylene continuous phase and a silane-grafted, cross-linked polyethylene disperse phase. Cross-linking of the grafted silane groups is taught through wetting in combination with a catalyst such as an acid. Bernhard teaches that the grafting reaction proceeds for 10-60 minutes (Page 8, lines 30-32) and does not restrict the amount of time during which the cross-linking reaction takes place; rather, Bernhard teaches that the wetting of the silane-grafted polyethylene is carried out “as long as is needed” to establish the desired morphology (Page 7, lines 35-37).

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24. The examiner further notes that, as reported in Table 8, all of the control Examples cited by applicant have a gel content in the dispersed phase that is less than or equal to 54%. As noted in prior Office Actions, however, Bernhard teaches the production of thermoplastic vulcanizates wherein the gel content of the polyethylene disperse phase is within the range of 60-95% (page 8, lines 40-43). The examiner notes that applicant's specification teaches that thermoplastic vulcanizates having 87% gel content in the dispersed phase have a cross-linking density greater than 5×10^{-5} mol/cm³ (see Example 19, Table 5). The examiner therefore takes the position that it would have been obvious to one of ordinary skill in the art at the time the invention was made to produce a thermoplastic vulcanizate inherently having the claimed properties in accordance with the teachings of Bernhard. Applicant is therefore required to provide factual evidence that demonstrates that the recited properties are not inherently present in the thermoplastic vulcanizates rendered obvious by Bernhard.

Allowable Subject Matter

25. Claims 1-23 and 33 would be allowable if rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.

26. The following is a statement of reasons for the indication of allowable subject matter: The sole independent claim is drawn to a process for the production of thermoplastic vulcanizates which comprises

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- (a) preparing a mixture of polymeric materials, including a matrix and a disperse phase component, and
- (b) carrying out dynamic vulcanization of the disperse phase component, said dynamic vulcanization comprising the steps of:
 - b.1) grafting an organic silane on said disperse phase component, whereby to produce grafted disperse phase component chains; and
 - b.2) cross-linking said disperse phase component chains in the presence of a cross-linking agent comprising an acid;wherein the weight ratio of said cross-linking agent to said organic silane is from 1:3 to 1:1, and the duration of said cross linking is from a minute to half and hour; and wherein said grafting and said cross-linking being are carried out in the molten state of said disperse phase component, wherein said grafting and cross-linking do not require in the absence of water the addition of water into said mixture of polymeric materials.

The closest prior art is Bernhard Rustige GmbH & Co KG, DE4402943, which teaches the production of thermoplastic vulcanizates via a process comprising a) preparing a blend of a matrix polymer and a disperse phase component polymer, and b) carrying out dynamic vulcanization of the dispersed phase component via the steps of b.1) grafting an organic silane onto the disperse phase component and b.2) cross-linking the disperse phase component in the presence of a cross-linking agent comprising an acid. The combination of the recited reaction steps with the recited limitations of the ratio of cross-linking agent to grafted organic silane, the duration of the cross-linking reaction, and that the cross-linking is performed in the molten state of the disperse phase component in the absence of water addition into the mixture of polymers, however, is not taught or fairly suggested by the prior art of record.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffrey Lenihan whose telephone number is (571)270-5452. The examiner can normally be reached on Monday through Thursday from 7:30-5:00 PM, and on alternate Fridays from 7:30-4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, James J. Seidleck can be reached on 571-272-1078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/ Irina S. Zemel/
Primary Examiner, Art Unit 1796

Jeffrey Lenihan
Examiner, Art Unit 1796

/JL/